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A Study on Ontology Query Result Based On Semantic Web

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Abstract: In current technology, search queries returns a large set of results produced in the web page, and also searching a relevant result tends to be a tedious process for the user. The user is looking for something but the result produced will contain information from various domains. So the user needs to search for the exact result for a long time by surfing. This will result in the increased time complexity. To overcome this problem we use the concept of semantic web by means of ontology. That is, we depict the system that create and handle ontology model which has the collection of objects to access, communicate and process Web ontology. There are many approaches that process ontology according to semantic Web based upon the characteristic of ontology data on Web. We create the web ontology by using the language RDF (resource description framework) and OWL (Web ontology language). By creating the ontology model so as to use hierarchical vocabularies, we eliminate redundancy of an expression and reusability can be improved. Furthermore, by means of semantic search, this model will help to reduce the users search time and exact information will be retrieved.

Keywords: Web Ontology Language, Resource Description Framework, Semantic, Web Ontology.

I. Introduction

Today, the semantic web is gaining a significant amount of attention from researchers, because it has the ability to solve complicated problems such as data integration. The core of the semantic web is ontology. Ontology is an explicit specification of a conceptualization [1]. Also it can be defined as a formally explicit set of terms formed in hierarchically structured way for describing concepts in a domain of discourse which can be used as a skeletal foundation for a knowledge base [2]. Ontology's play an important role in realizing the idea of database interoperability because of significant characteristics [3] such as: Adding rich, machine- readable semantics to data. The sharing of the semantic perspective of the information structure with people or software agent will be separating domain knowledge from operational knowledge which making explicit assumptions for a domain.

Although the use of ontology is not proposed as a substitute for database technology, a database is still more powerful than ontology for storing large-scale data sets. However, ontology can be used with a database to provide a conceptual vision of heterogeneous data sources distributed in a number of databases with an interface built on an ontological model. Thus, we need a system that utilizes both database and ontology techniques. However, while databases are widely available, the corresponding ontology's are not. Furthermore, constructing ontology from scratch is tedious, Time-consuming, error-prone and labour-intensive, while building one by hand presents the same difficulties [4] [5]. The proposed solution therefore starts by transforming a given database to ontology with some rules as guidelines, which can be used for manual transformation or as the basis for an automatic transformation process [6].

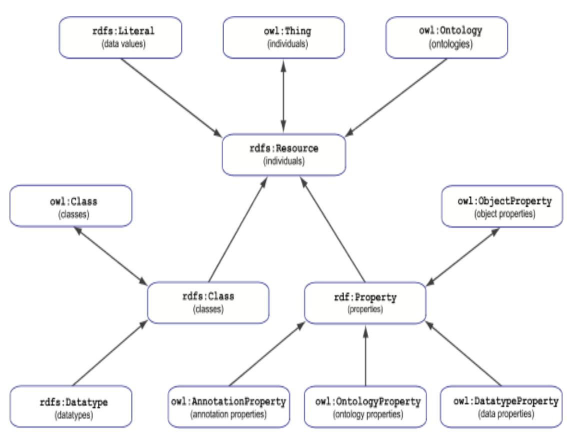

Fig 1. OWL File Representation

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Before going further, we have to clarify the difference between the terms 'transformation' and 'mapping'. The fig 1 shows about the representation of OWL file in the form of transformation. The transformation of a database to an ontology means creating an ontology from the rules, either manually or by using a system, whereas in mapping, the database and the ontology both exist [7] [8]. There are several studies or tools allowing mapping relational databases (RDBs) to RDF schema or OWL ontology. Some of the most notable approaches of this kind are R2O [9], D2RQ [10], Virtuoso RDF Views [11, 12] and Dart Grid [13]. There is W3C RDB2RDF Incubator Group [14] related to standardization of RDB to RDF mappings, the group has published its survey of mapping RDBs to RDF [15].R2O [9] approach defines declarative and extensible language (in xml) to describe mapping between given RDB and an OWL ontology or RDFS schema so that tools can process this mapping and generate triples that correspond to source RDB data. D2RQ [10] technology is another bridging technology where one can use SQL to describe the mapping information.

This language is closer to SQL level and is not as declarative as R2O. Both D2RQ [10] and Virtuoso RDF Views [11, 12] allow retrieving instance data from RDB on-the-fly during the execution of SPARQL queries over the RDF data store. The aim of this paper is to demonstrate a very simple standard SQL-based RDB to RDF/OWL mapping approach that is based on defining correspondence between the tables of the database and the classes of the ontology, as well as between table fields/links in the database and data type/object properties in the ontology (with possible addition of filters and linked tables in the mapping definition), and later automatically generating SQL statements that generate the RDF triples that correspond to the source database data. Our work setting for RDB to RDF/OWL translation involves the assumption that both the database and the ontology (or RDF schema) are given. The translation is not meant to be on-the-fly because huge amount of data can be involved. This corresponds to the practical database semantic re-engineering task.

The web ontology represents the data store in the web by means of the keyword based search engines. The web content can be retrieved by means of machine process in intelligent techniques. The semantic web will evolve out of the existing web. Most information currently available in the web is weakly structured such as, Audio, Video and Text. This can be overcome by means of the concept of web ontology. For creating this OWL file need to be generated to set the rule. The rule will be processed as machine understandable function. The semantic query answering will be an effective way for the user search. So the web content which is framed in the HTML can be processed in XML metadata representation. This metadata will be represented in the form of tree like structure so that the user can get the effective result.

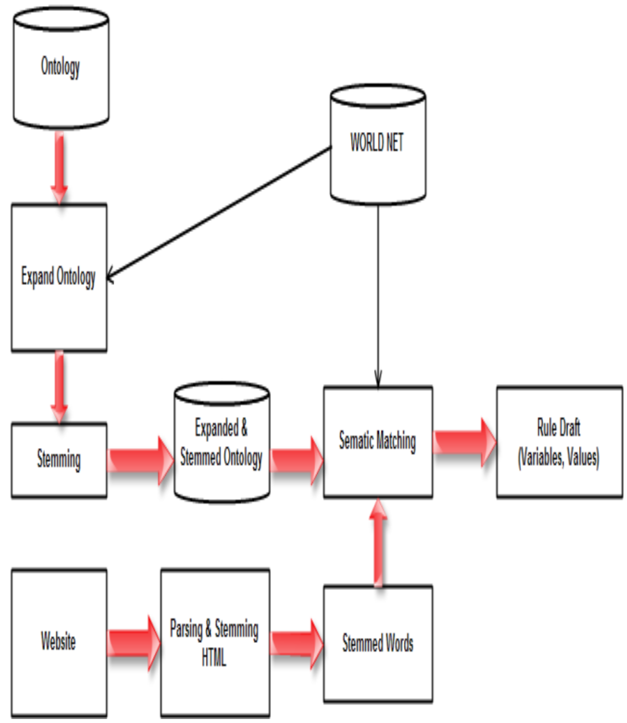

Fig 2. System Architecture

The fig 2 represents the overall architecture of the semantic web by means of ontology. The ontology refers to the semantic meaning of a particular search, it depends upon the user. It generates the rule and processed in the WorldNet which has the ability to get the semantic functionality of every search. So that the user search in the web will be effective.

II. MAPPING SCHEMA

We propose a bridging mechanism between relational databases and OWL ontology. We assume that the ontology and the database have been developed separately. Most often the database is of legacy type but the ontology reflects the semantic concerns regarding the data contents. Our approach is to make a mapping between these structures and store the mapping in meta-level relational schema (we are working towards mapping specification language that is suitable for the end user, who however is beyond the scope of this paper).

The initial process will be collecting the websites after that the pre-processing of the website should be done. Then

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the rules should be generated and extracted. These will form the ontology which could be generated and perform the semantic functions by means of the mapping analysis.

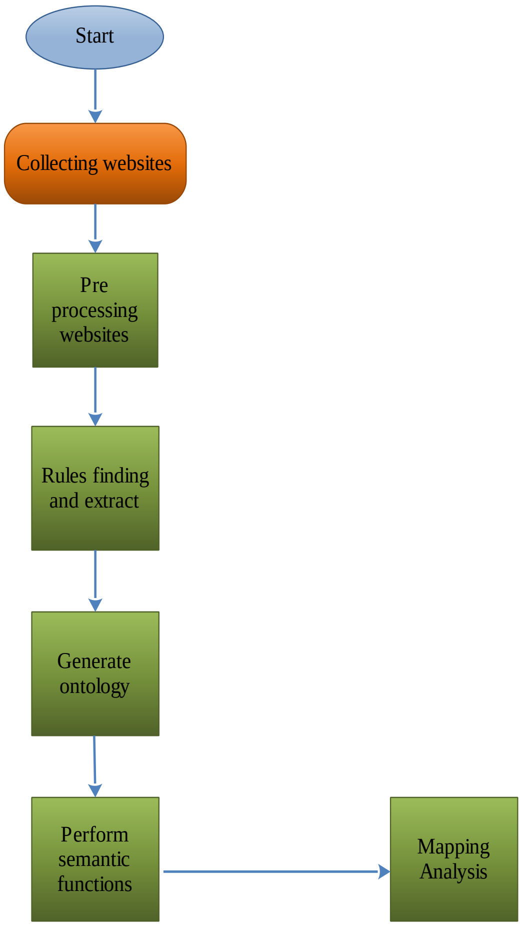

Fig 3. Mapping Schema

This approach allows us to use relational database engine to process mapping information and generate SQL sentences that, when executed, will create RDF/OWL-formatted data (RDF triples) describing instances of OWL classes and OWL data type and OWL object properties that correspond to the source RDB data. In the figure 3 the simplest form of the mapping schema is shown. An OWL class corresponds to a RDB table, an OWL data type property corresponds to a table field, and an OWL object property corresponds to a foreign key. In real life examples the mappings are not so straightforward. For example, an OWL class Person could be a domain for OWL data type property person Address. But the corresponding database table persons could have a foreign key reference to some other table having address information. To complicate things even more, one property of type xsd:string can correspond to a combination of columns spread over many tables in the database (e.g., country, city, street information stored in separate tables).

Other possible causes of direct mapping impossibility are subclass relation in the ontology, the use of many to many relations, the non-existence of "natural" foreign keys in RDB. Often databases are normalized and their structure is optimized out of performance concerns thus hiding true conceptual meaning.

III. CONCLUSION

In this paper we have demonstrated an example in a theoretical aspect of how relational database itself can be used to create mapping between a source relational database (legacy type) Computer Science and information technology Target OWL ontology and to generate RDF triples for instance data. The work is still in progress, which means new use cases are studied and the mapping schema is being continuously improved. Next step in our research is to study possibilities for SPARQL to SQL translation in correspondence to the defined mapping. Many approaches are currently used to investigate the transformation of a relational model into an ontological one; these use either a relational schema all these process can be function in the real time scenario.

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